

REMARKS

Applicants' attorney greatly appreciates the courtesy and careful consideration given by Examiner Ocampo and Examiner Walker during the March 6, 2001 interview.

Claims 1-3 have been amended in accordance with the agreement reached during the interview. Claim 3 has been further amended to specify that the second segment (rather than the first segment) is mounted to the first end of the pack. This amendment better conforms the language of the claim to the language of the specification. Further, new claims 14-26 have been added, each of these claims being dependent from independent claim 1, 2, or 3. The specification, including the title and abstract, has been amended to conform to the claims as amended. No new matter has been entered.

During the interview, the Examiners were shown a pleated filter element having radially extending pleats having a length of about 35 3/8 inches as measured along the longitudinal axis of the filter element. The inside diameter of the filter element was about 3 1/2 inches. Three views of the filter element were obtained from a copy machine and are attached as Attachments A1-A3. The Examiner newly presented U.S. Patent Nos. 5,527,463 and 5,601,717 and indicated that they were pertinent to independent claims 3 and 4.

Each of independent claims 3 and 4 defines a separation element comprising an end cap having first and second segments that are slidably arranged or engaged with one another. Neither the '463 patent nor the '717 patent discloses a separation element having such an end cap. The '463 patent discloses, in Figure 3, an outlet fitting 38 which engages and seals against a separate support plate 32 and, in Figure 6, a skirt 156 which engages the wall 114 of the vessel 112. The '717 patent discloses a lower cap 12. However, nothing in either of these patents discloses or suggests an end cap having first and second segments which slide with respect to one another. Accordingly, it is respectfully contended that independent claims 3 and 4 are patentable.

Independent claims 1 and 2 have been amended to define a separation element comprising pleats having a height greater than the distance between the inner and outer peripheries of the pleats and having joiner caps and/or end caps which comprise a polymeric, thermoplastic, or elastomeric material. As noted during the interview, an embodiment of the invention similar to those claimed in independent claims 1 and 2 was awarded the 1999 Vaaler Award by Chemical Processing Magazine. Copies of the pages

from the September 1999 Chemical Processing Magazine, in which the Vaaler Awards were presented, are attached as Attachments B1-B4. The awards are given for products that represent significant advances in the pertinent field of the award. Twelve chief judges and 21 associate judges, each independent and impartial, evaluated the entries and awarded a Vaaler Award to an embodiment corresponding to the inventions defined by independent claims 1 and 2. It is exactly this type objective indicia of non-obviousness that is entitled to great weight in determining non-obviousness of an invention. In light of this award, it is respectfully contended that claims 1 and 2 are patentable.

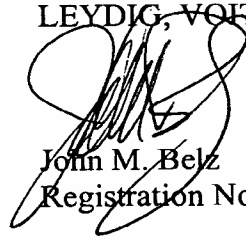
In the previous Office Action, the Examiner requested a drawing showing joiner caps. A proposed drawing numbered 14a is attached, the foundation for this drawing being taken from the specification including page 44. No new matter has been entered. Further, Figure 14 has been renumbered Figure 14b. Approval of these changes, shown in red in the attached Request for Approval of Drawing Change, is respectfully requested.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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Date: 6 April 2001

JMB/jj/cmg

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

CONNORS et al.

Art Unit: 1723

Application No.: 09/091,508

Examiner: M. Ocampo

Filed: October 30, 1998

For: SEPARATION
ELEMENTS

SPECIFICATION, CLAIMS AND ABSTRACT AS AMENDED IN RESPONSE TO
THE OFFICIAL ACTION MAILED MARCH 7, 2001

Amendment to the title:

~~SEPARATION ARRANGEMENT~~SEPARATION ELEMENTS

Amendments to the paragraph beginning at page 3, line 9:

In accordance with one aspect, the present invention is directed to a separation element for removing one or more components from a fluid flowing through the separation element. The separation element comprises two or more hollow pack sections, joiner caps, and first and second end caps. ~~Each hollow pack section has first and second ends and an entire and includes a porous medium which comprises a polymeric material or a glass fiber material.~~ Each hollow pack section includes a plurality of pleats, a retainer, first and second ends, and a porous medium. The plurality of pleats have roots, crowns, legs extending between the roots and the crowns, an inner periphery at the roots defining a upstream side, and an outer periphery at the crowns defining a downstream side. The height of each pleat greater than $(D-d)/2$, where D is the outer diameter at the outer periphery of the pleats and d is the inner diameter at the inner periphery of the pleats. The retainer is disposed around the plurality of pleats. The porous medium comprises a polymeric material or a glass fiber material. The joiner caps are attached to at least one end of each of the two or more pack serious and adjacent joiner caps are connected to

coaxially secure the pack sections and joiner caps into a hollow separation arrangement which is at least about forty inches in length and has an interior diameter of at least about two inches. The first and second end caps are attached to the hollow separation arrangement. One of the first and second end caps comprises a seal which has an outside diameter greater than the largest outside diameter of the hollow separation arrangement. The joiner caps and the end caps include a polymeric, thermoplastic or elastomeric material.

Amendments to the paragraph beginning at page 3, line 21:

In accordance with a further aspect, the present invention is directed to a separation element. The separation element comprises a hollow pleated pack ~~which has an interior and no more than two end caps connected to ends of the pack. The hollow pleated pack includes a porous medium comprising a polymeric material or a glass fiber material and includes a plurality of axially extending circumferentially spaced side seals and first and second end caps.~~ The hollow pleated pack includes a plurality of pleats, a retainer, first and second ends, and a porous medium. The plurality of pleats includes roots, crowns, legs extending between the roots and the crowns, an inner periphery at the roots defining an upstream side, and an outer periphery at the crowns defining a downstream side. Each pleat has a height greater than $(D-d)/2$ where D is the outer diameter at the outer periphery of the pleats and d is the inner diameter of the inner periphery of the pleats. The retainer is disposed around the pleats. The porous medium comprises a polymeric material or a glass fiber material. The hollow pleated pack is at least forty inches in length and has an interior diameter of at least two inches. Each end cap is connected to an end of the pack. One of the first and second end caps includes a seal having a larger outside diameter than the largest outside diameter of the hollow pleated pack and the other end cap. The end caps include a polymeric, thermoplastic or elastomeric material.

Amendments to the paragraph beginning at page 3, line 28 ending at page 4 with:

In accordance with a further aspect, the present invention is directed to a separation element. The separation element comprises a pleated pack and an end cap. The pack includes a porous medium and a first end. The pleated pack has a length greater than about

40 inches and an interior diameter greater than about 2 inches. The end cap includes a first segment mounted to the first end of the pack and a second segment spaced from the first end of the pack. The first and second segments are arranged to move with respect to one another. The end cap is extendable from a first position in which the first and second segments are spaced a first distance from each other to a second position in which the first and second segments move away from one another and are spaced a second distance from each other. The second distance is greater than the first distance.

Amendments to the paragraph beginning at page 4, line 9 with:

In accordance with a further aspect, the present invention is directed to a separation element. The separation element comprises a pack which includes a porous medium and a first end, and an end cap having a first segment, a second segment mounted to the first end of the pack, and a sealing member coupled to at least one of the first and second segments. The first segment is slidably engaged to the second segment such that the first segment is movable between first and second positions. When in the first position, the sealing member is relaxed, and in the second position, the sealing member is compressed by the first and second segments and thereby energized and has an outer diameter greater than the outer diameter of the second segment of the end cap.

Replace the paragraph beginning at page 4, line 18 with:

~~In accordance with another aspect, the present invention is directed to a separation assembly. The separation assembly comprises~~In embodiments of the present invention, a separation assembly may comprise a support cage and a separation element. The separation element is removably mounted in the support cage and comprises a pack having an inner region and first and second ends which include a porous medium having pleats in a laid-over pleat configuration, a retainer arranged with the pack to maintain the pleats in the laid-over configuration, and first and second end caps which are connected to the first and second ends of the pack. The separation element is free of any support structure in the inner region of the pack.

Replace the paragraph beginning at page 4, line 27 with:

~~In accordance with a further aspect, the present invention is directed a separation assembly. The separation assembly comprises~~In embodiments of the present invention, a separation assembly may comprise a support cage having a first end and a separation element removably mounted in the support cage. The separation element includes a pack and at least one end cap mounted to the pack. The at least one end cap is extendable to allow the separation element to move from a position removed from the first end of the support cage to a position in proximity to or in contact with the first end of the support cage to reduce loading on the separation element.

Replace the paragraph beginning at page 5, line 3 with:

~~In accordance with a further aspect, the present invention is directed to a separation assembly. The separation assembly comprises~~In embodiments of the present invention, a separation assembly may comprise a support cage having a first end, a seat arrangement, and a separation element removably mounted in the support cage. The separation element includes a pack and at least one end cap mounted on the pack. The at least one end cap includes a seal arrangement which slidably engages the seat arrangement. The separation element is axially movable within the support cage from a first position. The seal arrangement engages the seat arrangement and the separation element is spaced from the first end of the support cage to a second position wherein the seal arrangement engages the seat arrangement of the separation element and is closer to the first end of the support cage.

Replace the paragraph beginning at page 5, line 14 with:

~~In accordance with a further aspect, the present invention is directed to an end cap for capping an end of a separation pack. The end cap comprises~~In embodiments of the present invention, an end cap for capping an end of a separation pack may comprise a first segment including a first surface mountable to the end of the separation pack and a second segment including a sealing surface. The first and second segments are extendably connected such that the second segment is movable relative to the first segment.

Replace the paragraph beginning at page 7, line 19 with:

Figure 13a and 13b are sectional views of an alternative embodiment of the filter assembly of the present invention.

Figure 14a is a plan view of a portion of a hollow filter arrangement including pack sections connected by joiner caps.

Replace the paragraph beginning at page 7, line 21 with:

~~Figure 14 is a top~~ Figure 14b is an oblique view of a filter pack having multiple side seals.

Replace the paragraph beginning at page 44, line 1 with:

In accordance with another aspect of the invention, both the length and the diameter, especially the inner diameter of the filter element may be increased. ~~The As~~ shown in Figure 14(a), the longer, larger diameter filter elements are preferably constructed by joining together two or more shorter filter pack sections 216a, 216b using open end cap unions or joiner caps 221a, 221b to achieve hollow filter arrangements 217 with lengths of preferably greater than forty inches and interior diameters of at least two inches, more preferably greater than sixty inches and interior diameters of at least three inches and more preferably about four or more inches. Essentially, as the length of the filter elements is increased, the inside diameter is also preferably increased to reduce the core pressure differential. Depending on the length of the particular filter element and the lengths of the shorter filter pack sections, one or more pairs of joiner caps may be utilized. The two end caps utilized in these longer, larger diameter filter elements may comprise any suitable configuration such as those described above. However, one of the end caps joined to the filter pack preferably comprises a slidable end cap such as the slidable end cap 220 illustrated in Figure 12. The slidable end cap 220 allows for axial movement of the filter element 212 while providing a fluid tight seal via a seal 228 having an outside diameter greater than the largest outside diameter of the hollow filter element 212. The filter pack may comprise any suitable medium such as described above. Preferably, the filter pack comprises a material and configuration which is capable of supporting its own weight, wet or dry, without an interior or exterior support structure even at lengths greater than forty inches. In a preferred embodiment, the filter pack comprises a glass fiber medium having a pleated structure. The pleats may extend radially or they may be in a laid-over configuration as described in detail above.

IN THE CLAIMS:

Amendments to the existing claims:

1. (Twice Amended) A separation element for separating one or more components from a fluid flowing through the separation element, the separation element comprising:

(a) two or more hollow pleated pack sections, each pack section having a plurality of pleats, wherein the plurality of pleats includes roots, crowns, legs extending between the routes and the crowns, an inner periphery at the roots defining an upstream side, and an outer periphery at the crowns defining a downside side and wherein each pleat has a height h greater than $(D-d)/2$ where D is the outer diameter at the outer periphery of the plurality of pleats and d is the inner diameter at the inner periphery of the plurality of pleats, a retainer disclosed around the pleats, first and second ends ~~and an interior and including,~~ and a porous medium comprising a polymeric material or a glass fiber material;

(b) joiner caps attached to at least one end of each of the two or more pack sections, adjacent joiner caps being connected to coaxially secure the pack sections and joiner caps into a hollow separation arrangement being at least about 40 inches in length and having an interior diameter of at least of about 2 inches; and

(c) first and second end caps attached to the hollow separation arrangement, wherein one of the first and second end caps comprises a seal having an outside diameter greater than the largest outside diameter of the hollow separation arrangement, the joiner caps and the end caps including a polymeric, thermoplastic or elastomeric material.

2. (Twice Amended) A separation element for separating one or more components from a fluid flowing through the separation element, the separation element comprising:

(a) a hollow pleated pack having a plurality of pleats, wherein the plurality of pleats includes roots, crowns, legs extending between the roots and the crowns, an inner periphery at the roots defining an upstream side, and an outer periphery at the crowns defining a downstream side and wherein each pleat has a height h greater $(D-d)/2$ where D is the outer diameter at the outer periphery of the pleated pack and d is the inner

diameter at the inner periphery of the pleated pack, a retainer disposed around the pleats,
first and second ends ~~and an interior and including,~~ and a porous medium comprising a
polymeric material or a glass fiber material, the hollow pleated pack being at least about
40 inches in length and having an interior diameter of at least about 2 inches; and

(b) first and second end caps, each end cap being connected to an end of the pack,
wherein one of the first and second end caps includes a seal having a larger outside
diameter than the largest outside diameter of the hollow pleated pack and the other end
cap and wherein the end caps include a polymeric, thermoplastic or elastomeric material.

3. (Thrice Amended) A separation element comprising:

(a) a pleated pack including a porous medium and a first end and having a length
greater than about 40 inches and an interior diameter greater than about 2 inches; and

(b) an end cap including a first segment and a second segment mounted to the first
end of the pack, wherein the first and second segments are slidably arranged with one
another and wherein the end cap ~~being~~ is extendable from a first position in which the
first and second segments are spaced a first distance from each other to a second position
in which the first and second segments move away from one another and are spaced a
second distance from each other, the second distance being greater than the first distance.

4. (Twice Amended) A separation element comprising:

(a) a pack including a porous medium and a first end; and

(b) an end cap having a first segment, a second segment mounted to the first end
of the pack, and a sealing member coupled to at least one of the first and second
segments, the first segment slidably ~~engaged to~~ engaging the second segment such that the
first segment is movable between first and second positions, wherein in the first position,
the sealing member is relaxed, and in the second position, the sealing member is
compressed by the first and second segments, thereby energizing the sealing member, and
has an outer diameter greater than the outer diameter of the second segment of the end
cap.

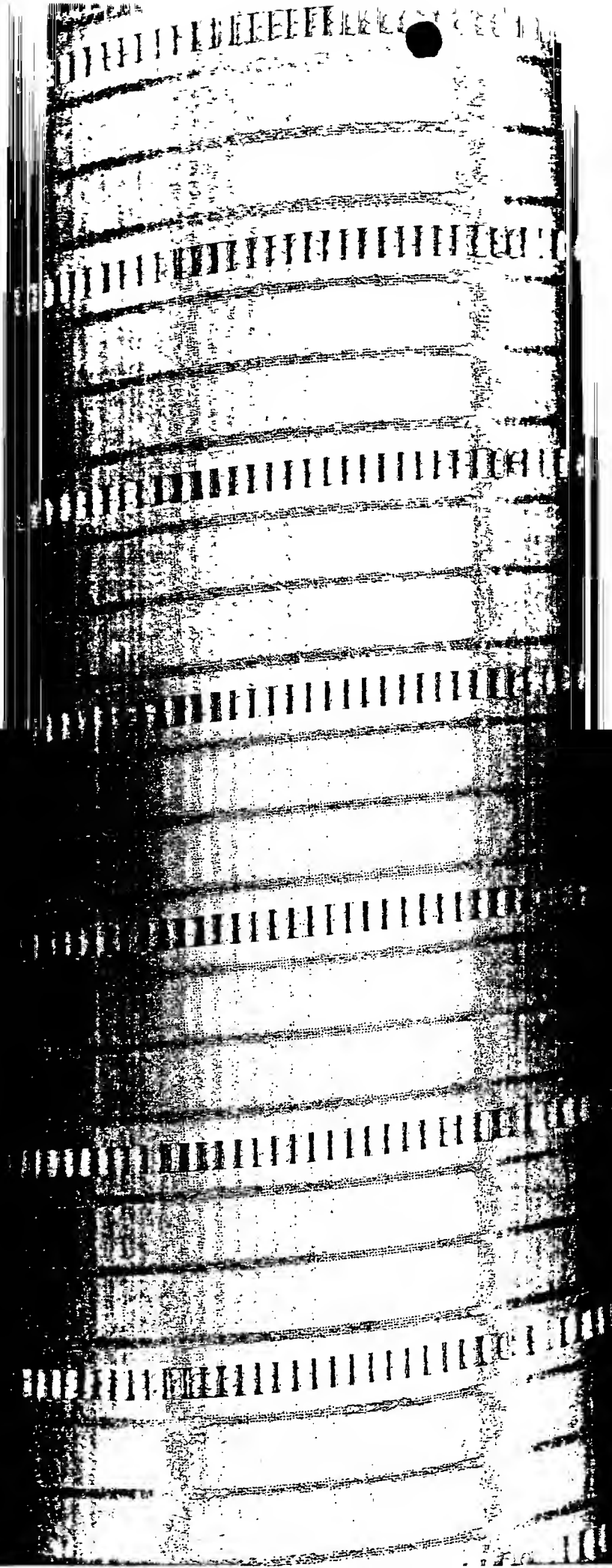
Amendments to the Abstract

ABSTRACT

~~A separation assembly includes a separation element disposed in a reusable cage. The separation element preferably has a pleated pack with the pleats in a laid over pleat configuration and two end caps. One of the two end caps is expandable or slidable between a first position and a second position for reducing the forces acting upon the separation element while maintaining a fluid tight seal when the separation element is under the influence of these forces. The application also concerns elongated hollow separation elements which are formed on the one hand of a single hollow pleated pack, on the other hand of adjoining pack sections. It further deals with the arrangement and maintaining of the pleats of the porous medium of the separation element. A separation element may comprise two or more hollow pleated pack sections, joiner caps, and first and second end caps. The joiner caps are attached to at least one end of each of the two or more pack sections. Adjacent joiner caps are connected to coaxially secure the pack sections and joiner caps into a hollow separation arrangement which is at least about 40 inches in length and which has an interior diameter of at least about two inches. The first and second end caps are attached to the hollow separation arrangement. A separation element may also comprise a hollow pleated pack and first and second end caps. The hollow pleated pack is at least about 40 inches in length and has an interior diameter of at least about two inches. The first and second end caps are connected to the ends of the pack. The separation element may also comprise a pleated pack and an end cap. The end cap includes a first segment and a second segment mounted to one end of the pack. The first and second segments are slideably arranged with one another and the end cap is extendable from a first position to a second position. The separation element may also comprise a pack and an end cap having a first segment, a second segment mounted to a first end of the pack, and a sealing member coupled to at least one of the first and second segments. The first and second segments are movable with respect to each other from a first position in which the sealing member is relaxed to a second position in which the ceiling member is compressed by the first and second segments.~~







Chemical Processing

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The 1999 Vaaler Awards

12 evolutionary
developments



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- Communication and conveyance
- Piping and the energy balance
- Conducting an energy audit
- Finding the right ISO registrar
- Jobs on the life sciences scene

In 1964, *Chemical Processing* magazine held the first Vaaler Awards to search out advances that improved operations or lowered costs for the chemical industry. At the time, CP's editorial staff wrote that the awards were "... an opportunity to pause and take stock ... to examine what has been done ... to put recent developments into a useful perspective."

All of that's still true. The 12 products recognized as winners this year represent significant advances for chemical plants and for the industry as a whole.

All entries were evaluated by independent, impartial judges. The judges' panel ran the gamut of industry expertise, representing decades of experience, knowledge and commitment to the chemical industry. The 12 chief judges and 21 associate judges assessed the entries and awarded the number of points they thought appropriate. Several may win in one category (this year four won in instrumentation), and none may be judged significant enough to win in another category. Points are awarded for the entry's importance to the chemical industry, its novelty and the breadth of application.

Congratulations to the winners and to the entrants who weren't chosen for an award but made valuable contributions to the industry just the same. Special thanks to the judges for poring over the entries and to everyone who took the time and expended the effort to prepare an entry. Your faith in the Vaaler Awards makes the process work.

By Deborah Salter Green, Vaaler awards editor

And the winners are ...

CORROSION CONTROL

CYONYX DCPD Composite Pipe
Smith Fiberglass Products Co.
Little Rock, AR

ENVIRONMENTAL

CONDENSING WESP™
Wet Electrostatic Precipitator
Croll-Reynolds Clean Air Technologies
Westfield, NJ

INSTRUMENTATION

Bailey-Fischer & Porter
COPA-XT Magnetic Flowmeter
ABB Automation Inc.,
Instrumentation Div.
Warminster, PA

Prosonic Flow Measurement Device
Endress + Hauser
Greenwood, IN

PULS 56 High-temperature
Radar Gauge
Ohmart/VEGA Corp.
Cincinnati

Beacon 2000-II NIR Analyzer
Petrometrix Ltd., Migdal, Israel

PROCESSING EQUIPMENT

Ultipleat® High Flow Filter
Pall Corp.
Port Washington, NY

SOFTWARE

Cyrax® 3-D Laser Scanning &
Modeling System
Cyra Technologies Inc.
Oakland, CA

Engineer's Aide SiNET XLC
EPCON International
Houston

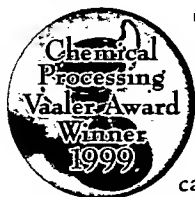
Visio Technical 5.0 PLUS
Visio Corp.
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VALVES, PIPING, PUMPS & HOSES

Epsilon "Zero Emission"
Dry Disconnect Hose
Aeroquip Corp.,
Chemical Containment Div.
Jackson, MI

Thermiculite™
Flexitallic L.P.
Houston

Small, high-flow filter needs fewer elements



The Ultiplear® High Flow Filter by Pall Corp. won a Vaaler Award for 1999 by addressing the issues that concern the industry, the panel of judges said.

"It is a product that can provide significant results for customers," one judge observed. "The reduced size and number of elements creates savings in initial cost as well as disposal cost."

The judge had more to say, too: "The longer service life means less line breaking, which minimizes risk, as well as benefitting the bottom line."

Pall's new system, the company said, replaces older bag and cartridge filters. It's an extension of the firm's line, improved to attain higher flow rates per filter cartridge.

One 6-in.-diameter Ultiplear can handle up to 500 gpm/1,900 lpm. Crescent-shaped pleat geometry, combined with a large diameter and range of available filter media, allows for fewer elements and smaller housings for high-flow applications, the company said.

High performance is achieved, Pall said, in a system that's two times to four times smaller than conventional depth or pleated filter technologies.

When it comes to changeouts, plants can have up to four times less volume of spent Ultiplear filters to dispose of vs. conventional-depth filters. Longer service also cuts disposal

costs, and the nonmetallic filters can be incinerated.

Maintenance and downtime are reduced because changeouts are less frequent.

The patented, crescent-shaped design allows the maker to pack a large quantity of filter media into the smaller disposable cartridge. Fluid flow remains uniform across the filter medium surface because the flow channel is the same width and length on both sides of the pleated filter medium.

Uniform flow is maintained, even with high differential pressure across the element, because of the filter's upstream support and downstream drainage layers. The layers, which sandwich the filter medium, hold the flow channels open. The pleats are held in place and prevented from becoming deformed by an external helical wrap bonded to each pleated tip along the outer diameter of the cartridge.



Pall Ultiplear High Flow Filter

♦ For more information on the Ultiplear® High Flow Filter—Pall Corp., Port Washington, NY.



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CP-9/99

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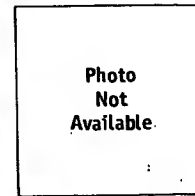
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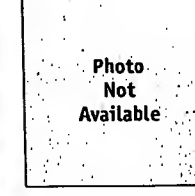
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